Isolated and Combined Effect of Plyometric Training and Battle Rope Training on Selected Physical Physiological and Skill Performance Variables among Women Volleyball Players

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INTRODUCTION

Volleyball is a high-intensity, dynamic sport that requires players to exhibit a range of physical attributes, including strength, explosive power, endurance, and agility, as well as specific technical skills like serving, spiking, blocking, and passing. These demands make strength and conditioning an essential aspect of training for volleyball athletes. As a result, coaches and researchers continuously seek effective training methods to enhance the physical, physiological, and skill performance of players.

Plyometric training, which involves explosive movements like jumping, bounding, and rapid muscle contractions, is widely recognized for its benefits in improving leg strength and explosive power. These attributes are critical for volleyball players, particularly in activities such as spiking, blocking, and jumping during gameplay. On the other hand, battle rope training, a relatively recent addition to sports conditioning programs, emphasizes both upper body strength and endurance through continuous dynamic resistance movements using heavy ropes. This type of training targets arm strength, endurance, coordination, and core stability, all of which are essential for volleyball players during spiking, serving, and defensive maneuvers.

STATEMENT OF THE PROBLEM

This study aims to investigate the isolated and combined effect of plyometric and battle rope training on specific physical, physiological and skill performance variables in intercollegiate women volleyball players. This research can provide valuable insights into how different training methods impact athletes' performance and physical characteristics.

OBJECTIVES OF THE STUDY

The following objectives were made to fulfil the purpose of the study:

- Evaluate the isolated effect of plyometric training.
- Assess the isolated effect of battle rope training.
- Determine the isolated and combined effect of plyometric and battle rope training.
- Compare the effectiveness of isolated versus combined training approaches.
- Investigate the retention of performance improvements.

RESEARCH GAP

- Most existing studies focus on Male volleyball players, leaving a gap in understanding the specific needs and responses of Female Volleyball players to different training regimens (Vescovi, J. D., & Frayne, D. (2015).
- Lack of Comprehensive studies exploring the transfer of training Effects from both Plyometric and Battle rope Training to Volleyball-specific skills and performance (Ramírez-Campillo, R. et al. (2016).

HYPOTHESES

It was postulated that:

1. It was hypothesized that there may be a significant difference in selected physical, physiological and skill performance variables due to isolated plyometric training among intercollegiate women volleyball players.

2. It was hypothesized that there may be a significant difference in selected physical, physiological and skill performance variables due to isolated battle rope training among intercollegiate women volleyball players.

3. It was hypothesized that there may be a significant difference in selected physical, physiological and skill performance variables due to the combined effect of isolated plyometric training and battle rope training among intercollegiate women volleyball players.

4. It was hypothesized that there may be a greater significant difference in selected physical, physiological and skill performance variables due to combined training than the isolated plyometric and battle rope training among intercollegiate women volleyball players.

5. It was hypothesized that there was no significant difference among the control group on the selected physical, physiological and skill performance variables of intercollegiate women volleyball players.

SIGNIFICANCE OF THE STUDY

1. The ultimate purpose of this study was to help and guide the coaches and players of volleyball to understand the benefit of the Isolated and combined effect of plyometric and battle rope training on selected physical, physiological variables and skill performance.
2. It also provides useful information for future researchers, helps to develop effective training programs, and supports decision-makers in sports and physical education**.**

DELIMITATIONS

This research is delimited to:

1. 100 Women volleyball players were chosen across 4 Affiliated Colleges in Bharathiar University, Coimbatore.
2. The age of the subject ranged from 17 to 24 years.
3. The duration of the training period will be restricted to 12 weeks only.

LIMITATIONS

The was subject to specific constraints:

1. Socio economic background is not taken into consideration.
2. Certain factors like life style, food habits, daily routine, climatic condition and Environmental factors are which may have effect on the result of the study were not taken into consideration.
3. The previous background of the subject on other physical activity has not been considered.

METHODOLOGY

To achieve the purpose of the study,100 Bharathiar university inter-collegiate women volleyball players were selected as subjects as randomly and divided into 4 groups. Group I Underwent plyometric training group (PTG), Group II Underwent battle rope training (BTG), Group III combination of plyometric and battle rope training (PTG & BTG) and Group IV acted as a control group (CG)who will not undergo any specialized training programme other than their daily routine. The age of the subject ranged from 17-24 years. Each group consist of 25 players.

Selection of variables

1. Independent Variables

1. Plyometric training

2. Battle rope training

2 Dependent Variables

Physical Variables

1. Leg strength

2. Leg explosive power

3. Arm Strength

4. Arm Explosive Power

Physiological Variables

1. Resting heart rate

2. Breath holding time

3. Vital Capacity

Skill performance variables

1. Service

2. Passing

3. Spiking

SELECTION OF VARIABLES AND CRITERION MEASURES

SI.NO	CRITERION VARIABLES	TEST	UNIT OF MEASURES
1	Leg strength	Leg Dynamometer **(Dr.per-olofAstrant-1952)**	Kilograms
2	Leg explosive power	Sergeant Vertical jump **(Dr.Dudley Allen Sargent ,1921)**	Meters
3	Arm Strength	1 RM Test **(Dr.Thomas Delorme, 1948)**	Minutes
4	Arm Explosive Power	Medicine Ball Throw **(Dr.Arthur S Steinhaus, 1933)**	Meters
5	Resting heart rate	Radial pulse method **(William Harvey ,1628)**	Seconds
6	Breath holding time	Time Manual nostril clip method **(Dr.Armand Trousseau ,1861)**	Seconds
7	Vital Capacity	Spirometer **(John Hutchinson ,1846)**	Liters
8	Service	Return of Service – 10 attempts **(Dr.Thomas K Cureton ,1951)**	Point
9	Passing	Wall volley test **(Dr.William R Pierson ,1961)**	Minutes
10	Spiking	AAHPERD Wall Test **(Dr.Ellen W Kelly,1964)**	Seconds

ANALYSIS OF DATA AND RESULT OF THE STUDY

Data collected from all four groups before (pre-test) and after (post-test) training were statistically analyzed to determine any significant improvements. Descriptive statistics such as mean and standard deviation were determined to get a basic idea of the data distributions. A dependent t-test was applied to find out the individual effects. Analysis of covariance (ANCOVA) was used to test the significance of the adjusted mean difference after testing between the experimental and control groups for each variable. Whenever they obtained 'F'ratio for the adjusted post-test means showed a significant difference between the paired adjusted means were found to be significant, the scheffe's post hoc test was calculated. In all the cases,0.05 level of significance was fixed to test the hypothesis.

CONCLUSION

The study revealed that a 12-week program of Plyometric Training, Battle Rope Training, and Combined Plyometric and Battle Rope Training significantly improved physical, physiological, and skill performance variables in women volleyball players. Significant differences were observed between the experimental groups and the control group, with the experimental groups showing marked improvement in the selected variables.

The findings indicate that Combined Plyometric and Battle Rope Training was particularly effective, leading to enhanced leg strength, leg explosive power, arm strength, arm explosive power, vital capacity, resting heart rate, breath-holding time, and volleyball-specific skills like passing, serving, and spiking. The progressive improvement in the experimental group suggests that this combined training regimen produced greater overall benefits compared to either Plyometric or Battle Rope Training alone. The continued practice of the drills also contributed to sustained improvements in all selected variables.

RECOMMENDATIONS

Integration of Combined Training: Volleyball coaches and trainers should integrate a combination of Plyometric and Battle Rope training into their regular training regimens. This approach has shown significant improvements in physical, physiological, and skill performance variables.

Structured Training Program: Implement a structured 12-week training program that combines Plyometric and Battle Rope exercises to achieve noticeable enhancements in players' performance.

Focus on Volleyball-Specific Skills: Emphasize exercises that replicate game-like conditions and target specific volleyball skills that demonstrated significant improvement during the study, using both Plyometric and Battle Rope training.

Monitoring and Adjustments: Regularly monitor players' progress and adjust the intensity, duration, and type of exercises within the combined training program to ensure continuous improvement.

Off-Season Training: Utilize the combined training approach during the off-season to maintain and further improve players' fitness levels and skills, ensuring optimal preparedness for the competitive season.

Encourage Further Research: Promote additional studies with larger sample sizes or diverse player demographics to validate these findings and refine training protocols.

Educational Workshops: Conduct workshops and training sessions to educate athletes and coaches on the benefits and proper execution of combining Plyometric and Battle Rope training.